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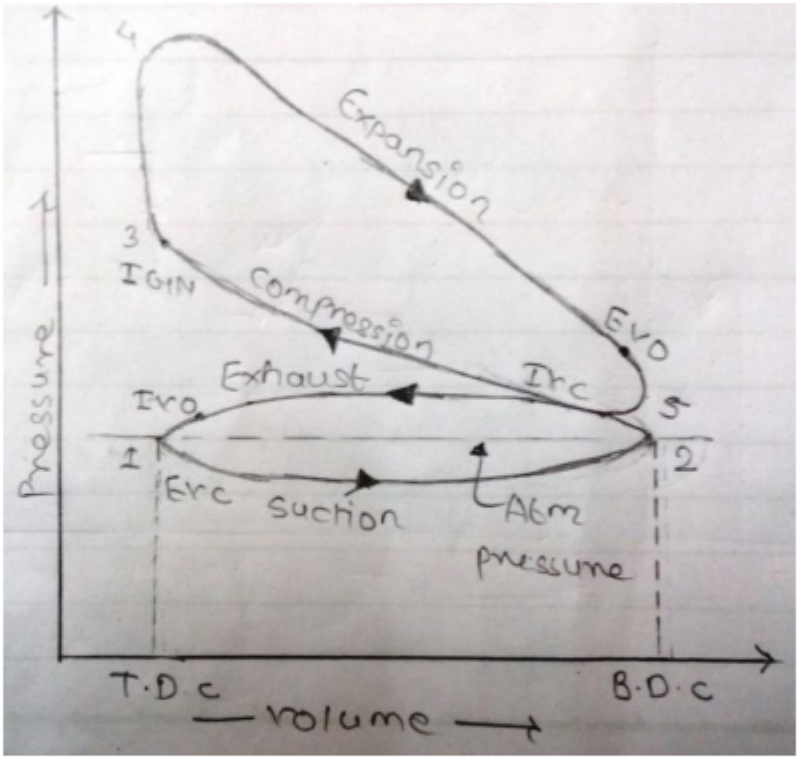
Draw theoretical and actual P-V diagrams for S.I. engines and explain briefly...

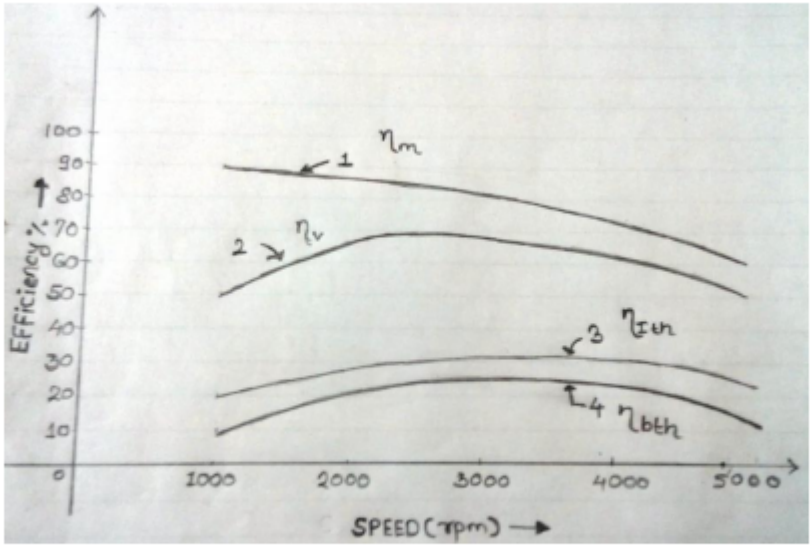


i. Four stroke petrol engine works on Otto cycle
ii. In these engines, the mixture of air and fuel is drawn in the engine cylinder, since ignition is due to spark, they are also called as spark ignition (S.I.) engine.
iii. Theoretically it is assumed suction stroke is represented by line 0-1 (I.e. at atmospheric pressure).
iv. As air fuel mixture come inside the cylinder the piston moves in upward direction and reaches to TDC. This compression process is represented by line 1-2.

State the role of following lubricant additives

Role of following lubricant additives 1. Zinc ditinophosphate: - Zinc ditinophosphate serves as an anti – oxidant and anticorrosive additive. 2. Fatty acids: - This type of additives prevents rusting of ferrous engine parts during and form acidic moisture accumulation during cold engine operation. 3. Organic Acids: - This type of additives improves the detergent action of lubricating oil. 4. Ester: - To lower the pour point of lubricating oil. 5. Silicon polymers: - This additive serves as Antifoam Agent. 6.

Various efficiencies of 4-stroke petrol engine run at full throttle over.....



Curve 1:- Mechanical efficiency **Curve 2:-** Volumetric efficiency

Curve 3:- Indicated thermal efficiency. **Curve 4 :-** Brake thermal efficiency

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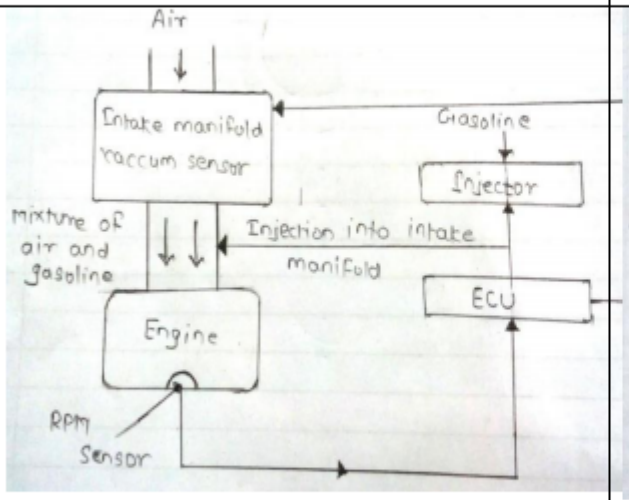
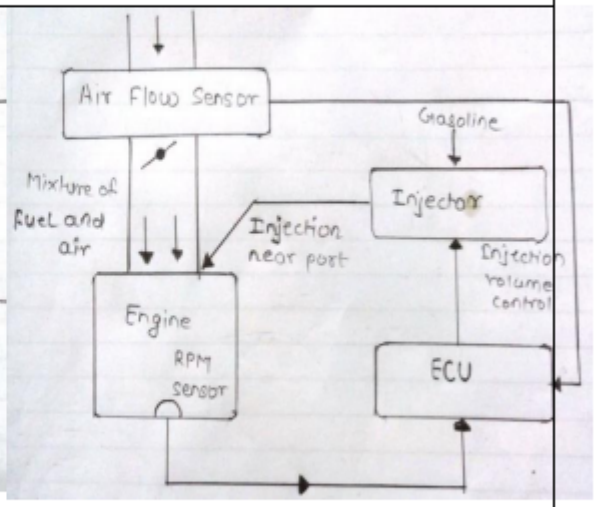
Differentiate between L-MPFI system and D-MPFI system.....

Sr. No.	D-MPFI System	L-MPFI System
1	It is Manifold injection system	It is Port injection system
2	Vacuum in the intake manifold and volume of air by its density are sensed in this type of MPFI system	Fuel metering is regulated by the engine speed and amount of air that actually enters in the engine.
3		
4	As air enters into intake manifold the manifold pressure is sensor detects the intake manifold vacuum and sends the information to the ECU	As air enters into the intake manifold , the air flow sensor measures the amount of air and sends information to ECU.

Define cut off ratio. Express it in terms of compression ratio and expansion ratio.

Cut off ratio (ρ):- cut off ratio is defined as the ratio of volume after addition of heat (V_3) to the Volume before addition of heat (V_2) in case of Constant pressure heat addition processes.

Cut off ratio = $\rho = \frac{V_3}{V_2}$

……

Expression:-

We know that Compression ratio = $r_c = \frac{V_1}{V_2}$ ……(equation no. 01)

……

We know that Expansion ratio = $r_e = \frac{V_4}{V_3} = \frac{V_1}{V_3}$ ……(equation no. 02)

……

When we divide equation no. 01 by Equation no. 2 we get

$$\frac{Compression\ ratio\ (r_c)}{Expansion\ ratio\ (r_e)} = \frac{V_1 / V_2}{V_1 / V_3} = \frac{V_1}{V_2} \times \frac{V_3}{V_1} = \frac{V_3}{V_2} = \text{Cut off ratio } (\rho)$$

The final relation is

Cut off ratio (ρ) = $\frac{Compression\ ratio\ (r_c)}{Expansion\ ratio\ (r_e)}$

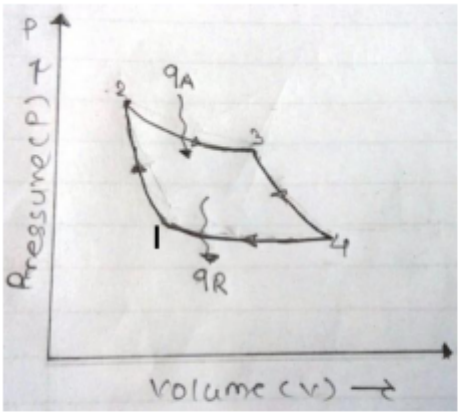
State the functions of following components used in battery ignition system……

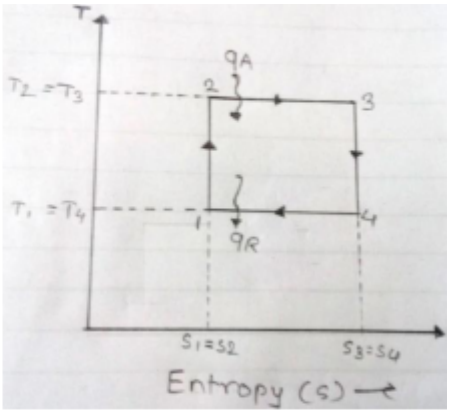
Function of Components used in battery ignition system

Sr. No.	Name of Component	Function
1	Capacitor	It is used to prevent the arcing and consequent burning of the contact points
2	Ballast Register	To regulate current in primary circuit. For starting purpose this resistor id by passed so that more current can flow in the primary circuit
3	Contact Breaker	When contact beaker points are closed and ignition switch on then current flowing from battery. When contact beaker points are open and ignition switch on or off then current will not flowing from battery.
4	Distributor	To interrupt the flow of current through the primary winding so that high voltage is produced in the secondary winding To distribute the so produced high voltage surge to different plugs at the right moment.

Draw P-V and T-S diagram for carnot cycle. Name the processes involved in it.....

PV and TS diagram of Carnot cycle





Process 1-2:- Isentropic or reversible adiabatic Compression process.

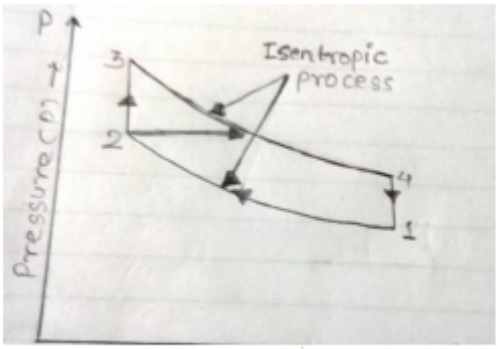
Process 2-3:- Reversible Isothermal heat addition process.

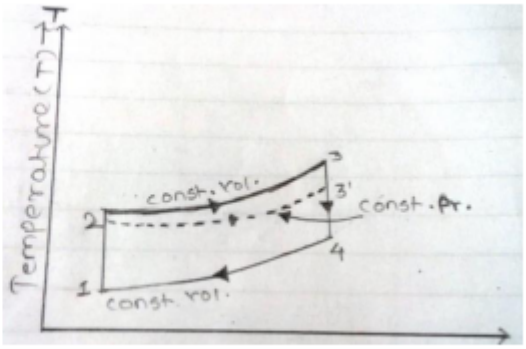
Process 3-4:- Isentropic or reversible adiabatic expansion process.

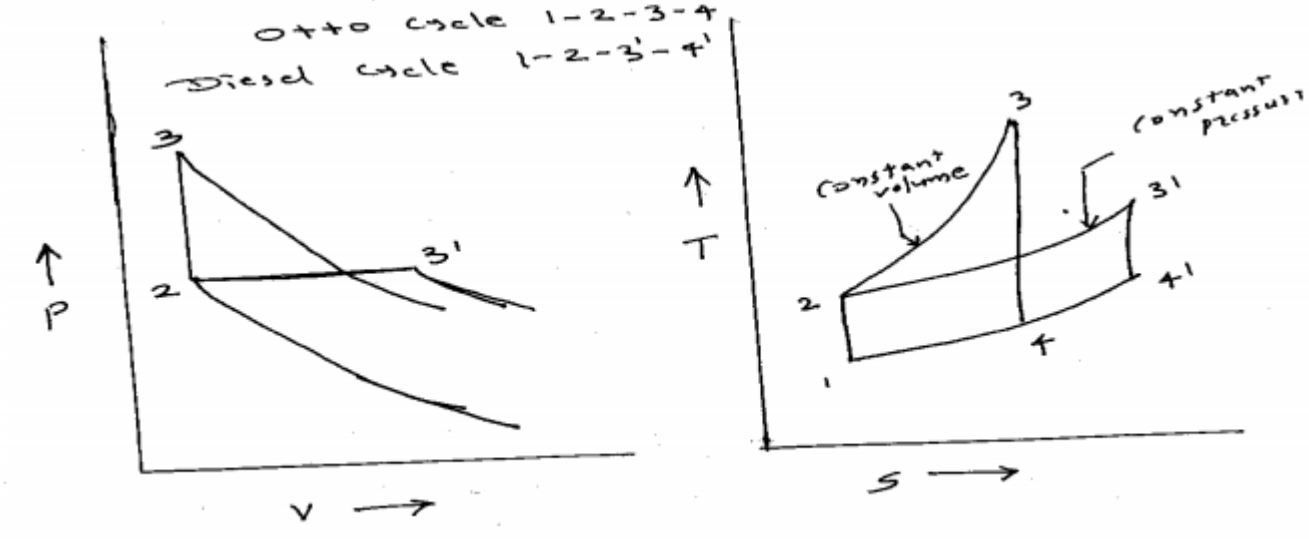
Process 4-1:- Reversible Isothermal heat rejection process.

Draw super imposed PV and TS diagrams of otto cycle.....

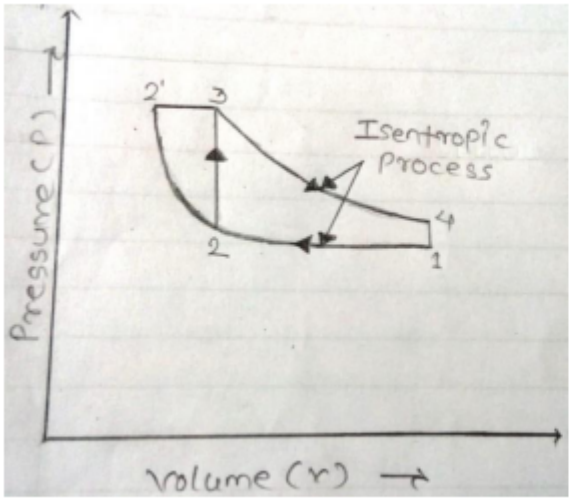
Same compression ratio and same heat rejected heat rejection

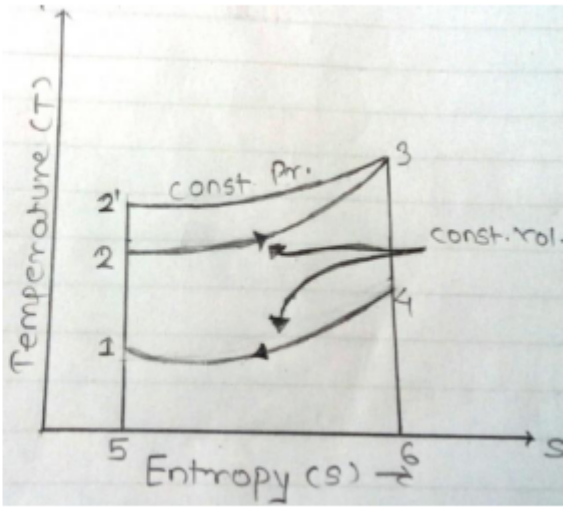


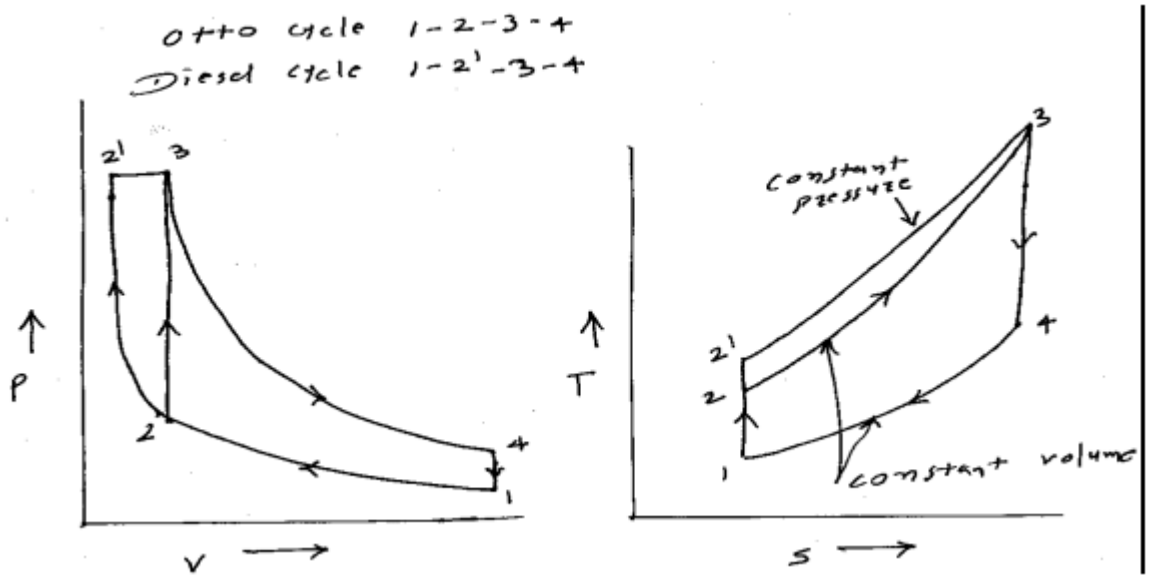




ii) For same maximum pressure and temperature and heat rejection







List any four applications of refrigeration.

i. To produce Ice in ICE Plant ii. To Store Vegetable or Domestic materials in Domestic Refrigerator. iii. To Transport Fish, Fruits etc. in Cold Storage. iv. To Cool Water in Water cooler. v. Processing of food products. vi. Processing of textiles, printing work, photographic materials etc. vii. Storage of ice, blood and medicines etc. viii. Preservation of photographic films , archeological documents etc

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State merits/demerits of gas turbine over T.C. engine with respect to following parameters.....

Sr. No.	Parameters	Gas Turbine	I.C. Engine
1	Mechanical Efficiency	High due to absence of reciprocating parts	Low due to large number of reciprocating parts
2	Starting Trouble	Starting of gas turbine is difficult and needs complex arrangements	Starting of I. C. Engine is simple
3	Weight to power ratio	The weight of gas turbine per kW power developed is low since the working pressures are low requiring lighter construction	The weight of I.C. engine per kW power developed is high since the working pressures are high requiring heavy construction
4	Part load thermal efficiency	Part load thermal efficiency is poor and it is less efficient	They are efficient and part load thermal efficiency is high

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